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DOWNHOLE TOOLS AND TECHNOLOGY

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Weather Plays Role In Rig Count Slump

The U.S. rotary rig count continued to fall during late February and early March, but strong showings in southern and western states indicate that at least part of the slump may be related to unusually severe late-winter weather in northeastern and central portions of the country.

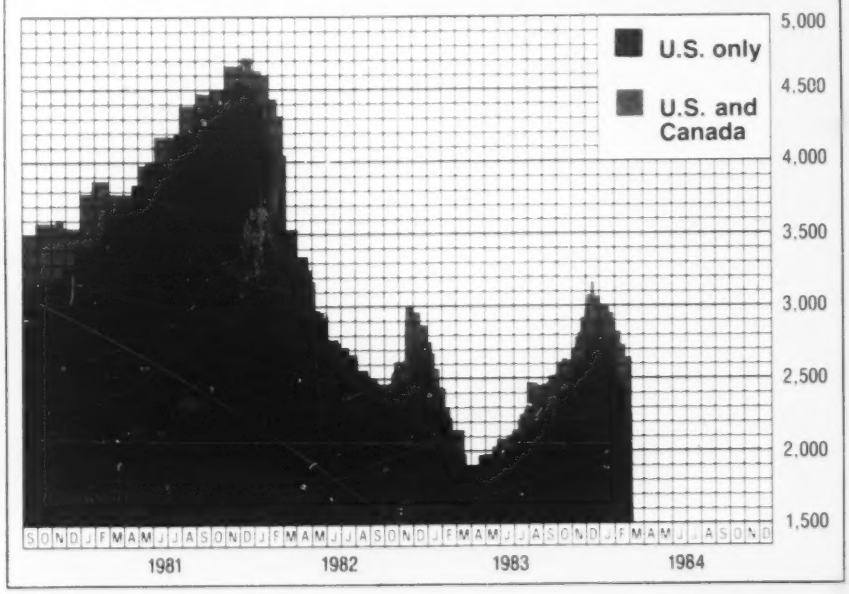
Illinois, for example, saw almost 40% of its active rigs idled between mid-February and mid-March. And Michigan drillers turned off 17 out of 31 active rigs during the same period.

Hardest hit, however, was New York, which went from 15 rigs turning on February 13 to zero by March 5. Weather was a factor there, also, but probably more important was a shut-in of natural gas invoked by buyers in response to surplus gas supplies in the state. Another factor was a shutdown by the state of 12 Bass Island producing wells in western New York so that officials could study the fractured dolomite reservoir.

Rotary rigs actually making hole in United States & Canada

As Reported To International Association Of Drilling Contractors By Hughes Tool Co.

	Feb. 20, 1984	Feb. 27, 1983	Mar. 5, 1984	Mar. 12, 1984
Alabama				
Land	15	14	13	13
Offshore	1	1	1	1
Alaska				
Land	9	9	10	10
Offshore	4	4	4	5
Total	13	13	14	15
Arkansas	21	20	22	19
California				
Land	72	80	75	74
Offshore	22	20	19	18
Total	94	100	94	92
Colorado	51	52	54	57
Florida	2	1	1	2
Hawaii	0	1	1	1
Idaho	1	0	0	0
Illinois	33	19	15	10
Indiana	4	2	3	5
Kansas	127	124	126	125
Kentucky	10	6	7	7
North Louisiana	32	31	30	30
South Louisiana				
Inland Waters	47	45	47	48
Land	101	104	98	103
Offshore	129	131	122	123
Total	309	311	297	304
Michigan	31	19	11	14
Mississippi	34	36	32	31
Montana	38	37	35	34
Nebraska	9	9	8	10
Nevada	1	2	2	2
New Jersey	0	1	1	1
New Mexico	69	64	62	66
New York	11	1	0	0
North Dakota	40	41	40	41
Ohio	55	35	28	24
Oklahoma	362	368	357	348
Pennsylvania	26	27	27	26
South Dakota	0	1	1	1
Texas				
Off-shore	42	38	42	50
Inland Waters	7	5	4	4
Dist. 1-S. Central Tex.	16	18	14	17
Dist. 2-Middle Tex. Coast	53	53	50	46
Dist. 3-Upper Tex. Coast	105	99	103	108
Dist. 4-Lower Tex. Coast	72	73	78	80
Dist. 5-Northeast Tex.	29	31	29	31
Dist. 6-Far Northeast Tex.	70	72	75	76
Dist. 7B-N. Central Tex.	57	54	52	42
Dist. 7C-W. Central Tex.	56	58	53	55
Dist. 8-Far West Tex.	134	128	147	145
Dist. 8A-West Tex.	58	50	52	50
Dist. 9-North Tex.	72	72	67	72
Dist. 10-Tex. Panhandle	54	57	55	55
Total	825	808	821	831
Utah	49	51	50	43
Virginia	2	3	3	3
Washington	1	1	1	1
West Virginia	31	27	28	26
Wyoming	123	115	112	107
Total U.S.	2,391	2,310	2,277	2,260
Canada	322	334	347	343
Canada-Off-shore	13	14	14	15
U.S. and Canada	2,726	2,658	2,638	2,618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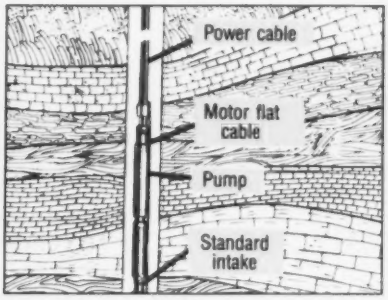

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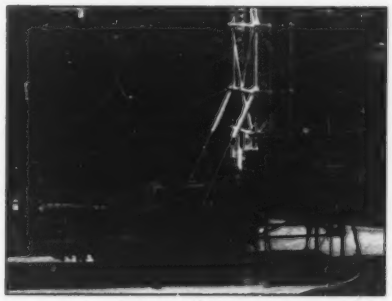

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DOWNHOLE TOOLS AND TECHNOLOGY

Amoco Research Tackles Drilling, Completion Technology 21

In an exclusive interview, Robert L. Huggins, drilling and production research director for Amoco, says the company wants to keep its research people with their feet on the ground, solving practical problems that have an economic impact.

Watch Out For Elastomer-Inhibitor Compatibility 28

by Michael J. Watkins, Battelle Petroleum Technology Center. Elastomer chemists and corrosion inhibitor chemists have recognized the problem for years, but the proprietary nature of each technology has slowed a solution.

What's New ... In Downhole Tools And Technology 42

Products and techniques applicable to operations downhole are available from a number of suppliers. Brief descriptions are presented, along with opportunities for readers to send for additional information.

Electrical Submersible Pump Teardown Inspection, Part 1 48

by James F. Lea, Amoco Production Co., and William J. Powers, TRW Reda. Frequently, the exact cause of a pump failure cannot be identified. Even so, however, it may be possible to identify remedies for operating problems.

How Temperature And Pressure Affect Clear Brines 58

by J. Tim Hubbard, Magcobar Group. Field practice generally ignores compressibility and thermal expansion determinations in favor of calculating the required fluid density from the bottomhole pressure, plus an overbalance safety margin.

How To Determine Your Rig's Depth Limit 70

by John L'Espoir, George E. Failing Co. The size of the drill pipe to be used with a rig is only one of many factors determining its depth rating. Other factors include capacities of the drawworks, mud pumps, and compressors.

Hand-Held Calculator Simplifies Abnormal Pressure Detection 82

by Michael A. Simpson, Mobil Oil Exploration and Producing Southeast Inc. The program was written so that, when time is limited, formation pressure can be calculated quickly and accurately, and monitored continuously.

DEPARTMENTS

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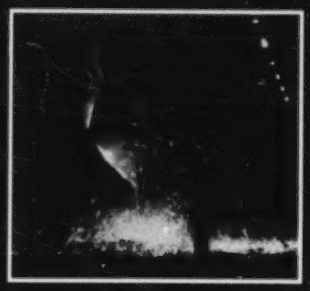
ABOUT THE COVER: PEI's Graphics Director, Don Fickert, prepared the paper sculpture which dramatically represents the drilling of a directional well.

NEXT MONTH: The annual Offshore Technology issue in May will discuss some of the innovative technology involved in developing frontier offshore areas.

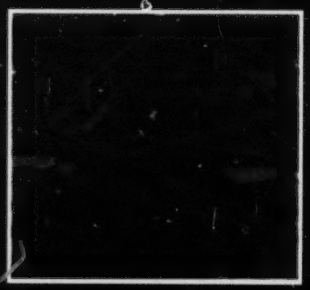
casing quality controlled steel production from ore to tube.



Algoma uses ore and coal from its own mines to produce molten iron then converts this into steel in its modern basic oxygen steelmaking plant. The result is total control of quality at every stage of production.

Continuous casting produces steel billets, which are then reheated and rolled into solid tube rounds.

A red-hot solid round is cross-rolled under a tremendous pressure, a hollow develops in the core... simultaneously pushed over a piercer mandrel, it becomes a completely seamless tube.



Algoma's automated heat treating process, including inside-outside quenching, builds in the high strength properties needed for critical applications. After finishing and final testing, seamless Soo casing is ready for shipment via rail, truck or water.

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draulic fractures may not be confined to pay zones and that less-than-optimum gas recovery will result with current stimulation technology."

Core analyses conducted since 1981, and recent flow testing at the MWX site, also reveal a significant number of natural fractures in the paludal zone. One of the objects of the Unconventional Gas Recovery Program, therefore, is to determine the nature of this fracture network and its effect on gas recovery and on stimulation performance.

Field tests completed while the MWX holes were being drilled also helped to determine that lenticular sands and surrounding shales are more permeable than expected, and that the orientation of hydraulic fractures can be reliably predicted. Seismic surveys to determine, as precisely as possible, the size and location of gas-bearing lenses throughout the Mesaverde formation are still underway.

A gas recovery operation at the Mesaverde's 6,500-ft level is being planned for late 1984, following complete analysis of the current field work.

World Rig Count Drops By 228 In 1983

The Free World rotary rig count dropped by 228 rigs during 1983 for a 16% loss that was led by Africa, which was down by 71 rigs (36.7%). Africa's decline was led by Algeria, which went from 80 active rigs at the beginning of 1983 to 35 in January 1984.

Europe, paced by declines in Germany and the UK, exhibited the second largest drop – 53 rigs, for a 24% loss. The Middle East, Latin America, and the Far East also registered declines during the year, with the South Pacific area (up 14%) standing tall as the only gainer.

International Rotary Rig Report, prepared by Hughes Tool Co.
(Figures in parentheses indicate how many of each country's rigs are offshore rigs.)

	Jan. 1983	Dec. 1984	Jan. 1984
Africa			
Algeria	80	35	35
Angola	13(9)	9(7)	9(7)
Benin	1(1)	1(1)	1(1)
Cameroun	7(6)	5(5)	5(5)
Chad	1	0	0
Gabon	10(8)	6(6)	6(6)
Guinea	1(1)	0	0
Ivory Coast	5(5)	1(1)	1(1)
Libya	23(2)	28(2)	28(2)
Morocco	5	5	5
Niger	1	0	0
Nigeria	21(11)	13(6)	13(6)
Rep. of Congo	5(4)	5(5)	5(5)
Rep. of Zaire	2(1)	2(1)	2(1)
Senegal	1	0	0
Sierra Leone	1(1)	0	0
South Africa	2(2)	2(2)	2(2)
Sudan	3	3	3
Tanzania	0	1	1
Tunisia	11(3)	7(2)	6(1)
	193(54)	123(38)	122(37)
Europe			
Austria	11	5	8
Denmark	2(2)	5(4)	3(3)
France	13	17(1)	21(1)
Germany	33	16	16
Greece	4(2)	3(1)	3(1)
Holland	16(12)	17(9)	17(9)
Ireland	0	1(1)	1(1)
Italy	37(7)	25(7)	25(7)
Norway	11(11)	9(9)	11(11)
Portugal	1	1	0
Spain	10(4)	6(2)	7(3)
Switzerland	1	0	0
United Kingdom	56(53)	42(2)	41(41)
Yugoslavia	25	14(2)	14(2)
	220(91)	161(76)	167(79)
Far East			
Bangladesh	2	2	2
Brunei	13(9)	9(7)	8(6)
Burma	34(1)	33(1)	33(1)
India	54(12)	58(17)	58(17)
Indonesia	90(33)	81(24)	81(24)
Japan	19(2)	21(2)	21(2)
Korea	0	1	1
Malaysia	11(11)	11(11)	10(10)
Pakistan	18	17	17
Philippines	10(1)	3(1)	2
Taiwan	0	5	3
Thailand	9(4)	12(6)	11(6)
	260(73)	253(69)	247(66)
Latin America			
Argentina	62(1)	73	70
Barbados	1	1	1
Bolivia	7	9	6
Brazil	100(34)	68(24)	71(26)
Chile	6(3)	6(3)	5(3)
Colombia	22(1)	20	13
Costa Rica	1	1	1
Ecuador	5(1)	5	6
Guatemala	3	1	1
Mexico	187(22)	185(33)	193(28)
Peru	18(5)	16(6)	16(6)
Trinidad	11(5)	10(5)	10(4)
Venezuela	63(18)	30(12)	31(9)
	486(90)	425(83)	424(76)
Middle East			
Abu Dhabi	44(27)	26(19)	30(22)
Bahrain	1	2	1
Dubai	4(2)	11(5)	7(3)
Egypt	40(22)	38(23)	38(23)
Iran	11(2)	20(2)	20(2)
Iraq	28	18	18
Jordan	0	3	3
Kuwait	5	3(1)	6(1)
Oman	12(2)	11	9
Qatar	4(2)	2(1)	2(1)
Ras Al Khaimah	2(1)	0	0
Saudi Arabia	28(12)	23(11)	19(11)
Sharjah	1	0	0
Syria	15	16	19
Turkey	33	24	24
Umm Al Qaiwain	1	0	0
	229(70)	197(62)	196(63)
South Pacific			
Australia	26(11)	30(11)	28(10)
New Zealand	1	4(3)	3(2)
Papua New Guinea	1(1)	1(1)	1(1)
	28(12)	35(14)	32(12)
Totals	1,416 (390)	1,194 (342)	1,188 (333)